6/12/01-3073

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June 12, 2001

Commander
Atlantic Division
Naval Facility Engineering Command
1510 Gilbert Street (Building N-26)
Norfolk, Virginia 23511-2699

Attn: Mr. Kirk Stevens
Navy Technical Representative
Code EV 23

Re: Contract N62470-95-D-6007
Navy CLEAN, District III
Contract Task Order (CTO) 0120
Sites 28 and 65 Letter Report
Marine Corps Base, Camp Lejeune

Dear Mr. Stevens:

Per our discussion at the May Partnering Meeting, the enclosed letter report documents the field programs and results from the recent field events at Sites 28 and 65. The data tables provided reflect the results of the data validation, which was not completed at the time of Partnering when the preliminary data was presented.

SITE 28

Field Activities

A shallow monitoring well was installed at Site 28 to evaluate potentially lead-impacted groundwater near the location where the highest concentrations of lead were found in soils during the Remedial Investigation (1994). A two-inch well was installed to a depth of 22 feet below groundwater surface (bgs) at the location shown on Figure 1. A groundwater sample was collected from this well and analyzed for Target Analyte List (TAL) metals. In addition, three soil samples were collected from the boring (surface, mid depth, and above the water table) and were also analyzed for TAL metals.

Table 1 summarizes the soil and groundwater results.

Results

Soil Investigation

The inorganics arsenic and iron were detected at concentrations exceeding both Region III RBCs and Region IX PRGs in the surface soil samples. Lead was detected in site soils, but at concentrations below these criteria.

Groundwater

Barium concentrations in groundwater were detected above the MCL and NCWQS. In addition, iron and manganese were detected at concentrations above the NCWQS. Lead was not detected in the groundwater sample.

SITE 65

Field Activities

Post-RI sampling was conducted near Site 65 to determine if contaminants were released from dissolved drum piles that were discovered in early 2001. The piles are located the wooded area to the south of Courthouse Bay Pond along its tributary to Courthouse Bay. A site walk was conducted in March 2001 and the location of piles was verified.

Soil, surface water, sediment, and groundwater samples were collected from the area shown on Figure 2 in April 2001. Table 2 summarizes the post-RI sampling analytical results.

Results

Soil Investigations

Two surface soil and four subsurface soil samples were collected at Site 65 in April of 2001 and were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, and metals. VOCs, SVOCs, pesticides, herbicides, and metals were detected in the surface soil samples. The inorganics aluminum, copper, and sodium were detected at concentrations exceeding both Region III RBCs and Region IX PRGs. Thirteen inorganics were detected at concentrations exceeding two times base background concentrations.

VOCs, SVOCs, pesticides, herbicides, and inorganics were also detected in subsurface soils. The inorganic arsenic was detected at concentrations exceeding both Region III RBCs and Region IX PRGs. The essential nutrients calcium and sodium were detected at concentrations exceeding two times base background concentrations.

The source of inorganics in surface and subsurface soils at Site 65 is believed to be rusting metal debris disposed of at the site.

Groundwater Investigation

Groundwater samples were collected from three temporary wells. VOCs, total, and dissolved metals were detected in groundwater. Of these compounds, both total and dissolved concentrations of iron and manganese exceeded NCWQS. These inorganics are normally found at similar concentrations in groundwater throughout the Base.

Surface Water and Sediment Investigations

Three surface water and sediment samples were collected. VOCs and metals were detected in surface water. The metals arsenic, chromium, copper, iron, lead, manganese, thallium, and zinc were detected at concentrations exceeding EPA Tier II freshwater screening values and/ or NCWQS for surface water. Water evaporation and soil erosion are suspected to be the source of elevated inorganics in the surface water.

VOCs, SVOCs, pesticides, herbicides, and metals were detected in sediment. The pesticides 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha chlordane, dieldrin, endrin, endrin aldehyde, endrin ketone, and gamma chlordane were detected at concentrations exceeding Region IV ecological screening levels for freshwater. The levels detected in these samples are similar to base-wide concentrations from the historical use of pesticides at Camp Lejeune. The inorganics barium, copper, and lead were also detected at concentrations exceeding Region IV ecological screening levels for freshwater. The inorganics are suspected to be the result of metals precipitation accumulated within the surface water as evaporation occurs.

Should you have any questions or comments on the enclosed letter, please do not hesitate to contact me at (412) 269-2033.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Richard E. Bonelli, P.G.
Activity Coordinator

REB/lp

cc: Mr. Thomas Burton, MCB, Camp Lejeune (w/attachments)
Mr. Rick Raines, MCB, Camp Lejeune (w/attachments)
Mr. Channing Blackwell, LANTDIV (w/attachments)
Ms. Gena Townsend, U.S. EPA (w/attachments)
Mr. David Lown, NC DENR (Raleigh) (w/attachments)
Dr. Charlie Stehman, NC DENR (Wilmington) (w/attachments)
Ms. Diane Rossi, NC DENR (Wilmington) (w/attachments)
Mr. Jim Dunn, OHM/IT (w/attachments)
Mr. Scott Bailey, CH2M HILL (w/attachments)
Mr. Dave Collins, CH2H HILL (w/attachments)

TABLES

TABLE 1

METALS IN SOIL AND GROUNDWATER - APRIL 2001
OPERABLE UNIT NO.7 - SITE 28
MCB, CAMP LEJEUNE, NORTH CAROLINA

Media	Fraction	Detected Organics/Inorganics	Site Concentrations			
			Min. Conc.	Max. Conc.	Location(s) of Maximum Concentration	Detection Frequency
Soil	Total Metals					
		Aluminum	3850 J	4620 J	28-MW09-02D	4/4
		Antimony	0.46 J	2.9 J	28-MW09-00	3/4
		Arsenic	1.3	1.7	28-MW09-00	4/4
		Barium	17.2	37.9	28-MW09-00	4/4
		Cadmium	0.13 J	1.3 J	28-MW09-00	2/4
		Calcium	494 J	24700 J	28-MW09-02	4/4
		Chromium	5.5	12.3	28-MW09-00	4/4
		Cobalt	0.71	0.99	28-MW09-00	3/4
		Copper	0.35 J	53.1	28-MW09-00	4/4
		Iron	2650	8520	28-MW09-00	4/4
		Lead	4.1	128	28-MW09-00	4/4
		Magnesium	140	510	28-MW09-02	4/4
		Manganese	9.1 J	144 J	28-MW09-00	4/4
		Mercury	0.024 J	0.26	28-MW09-00	4/4
		Nickel	0.65	6.3	28-MW09-00	4/4
		Potassium	366	399	28-MW09-02	3/4
		Silver	0.16 J	0.46 J	28-MW09-00	2/4
		Vanadium	7	9	28-MW09-00	4/4
		Zinc	36.5	364	28-MW09-00	3/4
Groundwater	Total Metals					
		Barium	2290	2290	GW09-01AD	2/2
		Calcium	18800	18800	GW09-01AD	2/2
		Chromium	0.75 J	0.75 J	28-GW09-01A	1/2
		Iron	2370	2380	28-GW09-01AD	2/2
		Magnesium	34600	34600	GW09-01AD	2/2
		Manganese	58.7	59	28-GW09-01A	2/2
		Potassium	88500 J	88500 J	GW09-01AD	2/2
		Sodium	112000	113000	28-GW09-01AD	2/2

Notes:
Metal concentrations in soil are presented in mg/Kg (ppm); metal concentrations in groundwater are presented in µg/L (ppb).

TABLE 2

POST RI SAMPLING - APRIL 2001
OPERABLE UNIT NO. 9 - SITE 65
MCB, CAMP LEJEUNE, NORTH CAROLINA

Media	Fraction	Detected Organics/Inorganics	Site Concentrations			
			Min. Conc.	Max. Conc.	Location(s) of Maximum Concentration	Detection Frequency
Surface Soil	Volatiles					
		1,1,2-Trichloro-1,2,2-trifluoroethane	3 J	3 J	65-IS01-00	1/2
		1,2,4-Trichlorobenzene	0.6 J	0.6 J	65-IS01-00	1/2
		Toluene	0.7 J	0.7 J	65-IS01-00	1/2
		Xylenes (Total)	0.6 J	0.6 J	65-IS01-00	1/2
	Semivolatiles					
		Caprolactam	220 J	220 J	65-IS03-00	1/2
		Phenol	580	580	65-IS01-00	1/2
		bis(2-Ethylhexyl)phthalate	120 J	330 J	65-IS03-00	2/2
	Pesticides/PCBs					
		4,4'-DDD	4.8 J	4.8 J	65-IS01-00	1/2
		4,4'-DDE	1.3 J	1.3 J	65-IS01-00	1/2
		4,4'-DDT	3.4 J	3.4 J	65-IS01-00	1/2
		Alpha-BHC	1.3 J	1.3 J	65-IS03-00	1/2
		Beta-BHC	3.4 J	3.4 J	65-IS03-00	1/2
		Delta-BHC	1.3 J	1.3 J	65-IS03-00	1/2
		Endosulfan I	0.56 J	0.56 J	65-IS03-00	1/2
		Endosulfan II	2.1 J	2.1 J	65-IS01-00	1/2
		p,p'-Methoxychlor	23 J	23 J	65-IS01-00	1/2
	Herbicides					
		2,4 5-TP (Silvex)	1.2 J	3.4 J	65-IS01-00	2/2
		2,4,5-T	1.2 J	3.4 J	65-IS01-00	2/2
		2,4-D	14	14	65-IS01-00	1/2
		2,4-DB	34 J	41 J	65-IS01-00	2/2
		4-Nitrophenol	2.2 J	10 J	65-IS03-00	2/2
		Dalapon	11 J	14 J	65-IS03-00	2/2
		Dicamba	2.1 J	2.1 J	65-IS03-00	1/2
		Dichloroprop	22 J	48 J	65-IS03-00	2/2
		Dinoseb	2.5 J	5.1 J	65-IS03-00	2/2
		Pentachlorophenol	0.62 J	0.62 J	65-IS01-00	1/2
Surface Soil	Total Metals					
		Aluminum	1490	9140	65-IS03-00	2/2
		Barium	5.3	416	65-IS03-00	2/2
		Beryllium	3.2	3.2	65-IS03-00	1/2
		Calcium	296	10400	65-IS03-00	2/2
		Chromium	2.2	10.1	65-IS03-00	2/2
		Cobalt	5.9	5.9	65-IS03-00	1/2
		Copper	0.94	43.1	65-IS03-00	2/2
		Iron	994	9150	65-IS03-00	2/2
		Magnesium	62.4 J	951 J	65-IS03-00	2/2
		Manganese	10.2	66.8	65-IS03-00	2/2
		Mercury	0.26	0.26	65-IS03-00	1/2
		Nickel	0.65	43.6	65-IS03-00	2/2
		Potassium	1460	1460	65-IS03-00	1/2
		Selenium	2.2 J	2.2 J	65-IS03-00	1/1
		Sodium	138 J	138 J	65-IS03-00	1/2
		Vanadium	2.1 J	176	65-IS03-00	2/2
		Zinc	13.8	13.8	65-IS03-00	1/2

TABLE 2

POST RI SAMPLING - APRIL 2001
OPERABLE UNIT NO. 9 - SITE 65
MCB, CAMP LEJEUNE, NORTH CAROLINA

Media	Fraction	Detected Organics/Inorganics	Site Concentrations			
			Min. Conc.	Max. Conc.	Location(s) of Maximum Concentration	Detection Frequency
Subsurface Soil	Volatiles					
		1,1,2-Trichloro-1,2,2-trifluoroethane	3 J	4 J	65-IS02-01	2/4
		1,2,4-Trichlorobenzene	0.7 J	0.7 J	65-IS02-01	1/4
		Chlorobenzene	0.6 J	0.6 J	65-IS01-03	1/4
		Toluene	1 J	2 J	65-IS01-03	2/4
		Xylenes (Total)	1 J	1 J	65-IS01-03	1/4
	Semivolatiles					
		Anthracene	25 J	25 J	65-IS02-01D	1/4
		Benzo(a)anthracene	82 J	82 J	65-IS02-01D	1/4
		Benzo(a)pyrene	45 J	45 J	65-IS02-01D	1/4
		Benzo(b)fluoranthene	110 J	110 J	65-IS02-01D	1/4
		Benzo(k)fluoranthene	54 J	54 J	65-IS02-01D	1/4
		Caprolactam	53 J	79 J	65-IS02-01D	2/4
		Carbazole	18 J	18 J	65-IS02-01D	1/4
Subsurface Soil	Semivolatiles (continued)	Chrysene	100 J	100 J	65-IS02-01D	1/4
		Fluoranthene	33 J	110 J	65-IS02-01D	2/4
		Pyrene	22 J	94 J	65-IS02-01D	2/4
		bis(2-Ethylhexyl)phthalate	170 J	24000 D	65-IS02-01	4/4
	Pesticides					
		4,4'-DDD	0.4 J	0.64 J	65-IS03-03	2/4
		4,4'-DDE	0.23 J	1.3 J	65-IS02-01	3/4
		4,4'-DDT	0.49 J	3.2 J	65-IS02-01	4/4
		Aldrin	0.086 J	0.086 J	65-IS03-03	1/4
		Alpha chlordane	0.12 J	0.44 J	65-IS02-01	3/4
		Alpha-BHC	0.4 J	0.42 J	65-IS03-03	2/4
		Beta-BHC	0.19 J	0.54 J	65-IS01-03	2/4
		Delta-BHC	0.12 J	0.12 J	65-IS01-03, 65-IS03-03	2/4
		Dieldrin	0.51 J	0.51 J	65-IS03-03	1/4
		Endosulfan I	1.4 J	1.4 J	65-IS02-01D	1/4
		Endosulfan II	0.065 J	0.79 J	65-IS02-01D	3/4
		Endosulfan sulfate	0.18 J	0.18 J	65-IS03-03	1/4
		Endrin	0.086 J	0.21 J	65-IS01-03	2/4
		Endrin aldehyde	0.066 J	0.066 J	65-IS03-03	1/4
		Endrin ketone	0.42 J	0.42 J	65-IS03-03	1/4
		Gamma chlordane	1.6 J	1.8 J	65-IS02-01	2/4
		Gamma-BHC (Lindane)	0.055 J	0.055 J	65-IS03-03	1/4
		Heptachlor	0.038 J	0.2 J	65-IS01-03	2/4
		Heptachlor epoxide	0.047 J	0.047 J	65-IS03-03	1/4
		p,p'-Methoxychlor	1.3 J	33 J	65-IS01-03	3/4
	Herbicides					
		2,4-D	5.4 J	11 J	65-IS02-01D	2/4
		2,4-DB	21 J	31	65-IS01-03	3/4
		4-Nitrophenol	2.1 J	5.3 J	65-IS02-01	3/4
		Dalapon	4.7 J	33 J	65-IS02-01	4/4
		Dichloroprop	19 J	23 J	65-IS02-01D	3/4
		Dinoseb	2.6 J	2.7 J	65-IS02-01D	3/4
		Pentachlorophenol	0.24 J	0.29 J	65-IS02-01D	2/4

TABLE 2

POST RI SAMPLING - APRIL 2001
OPERABLE UNIT NO. 9 - SITE 65
MCB, CAMP LEJEUNE, NORTH CAROLINA

Media	Fraction	Detected Organics/Inorganics	Site Concentrations			
			Min. Conc.	Max. Conc.	Location(s) of Maximum Concentration	Detection Frequency
Subsurface Soil	Total Metals					
		Aluminum	1350	2690	65-IS02-01D	4/4
		Arsenic	0.32 J	0.66 J	65-IS02-01D	4/4
		Barium	6.3	7.7	65-IS02-01	4/4
		Calcium	125	945	65-IS02-01D	4/4
		Chromium	2.2	2.8	65-IS01-03	4/4
		Copper	0.83	1.5	65-IS01-03	4/4
		Iron	786	1530	65-IS01-03	4/4
		Lead	2.3	2.3	65-IS01-03	1/4
		Magnesium	49.8 J	108 J	65-IS02-01D	4/4
		Manganese	13.7	18.2	65-IS01-03	3/4
		Nickel	0.81	0.95	IS03-03	4/4
		Sodium	27 J	320	65-IS02-01D	2/4
		Vanadium	1.8 J	3.5	65-IS02-01D	4/4
Groundwater	Volatiles					
		1,1,2-Trichloro-1,2,2-trifluoroethane	0.2 J	0.2 J	65-IS03-GW01	1/3
		Acetone	4 J	4 J	65-IS02-GW01	1/2
		Carbon disulfide	0.2 J	0.2 J	65-IS02-GW01D	1/4
		Ethylbenzene	0.2 J	0.2 J	IS02-GW01D	2/4
		Methylene chloride	0.7	0.7	65-IS01-GW01	1/4
	Total Metals					
		Aluminum	3530	22200	65-IS01-GW01	4/4
		Barium	33.2	75	65-IS01-GW01	4/4
		Calcium	13900	29100	65-IS03-GW01	4/4
		Chromium	4.4 J	27.9	65-IS01-GW01	4/4
		Cobalt	0.47 J	4.7 J	65-IS01-GW01	4/4
		Copper	2.6 J	8.6	65-IS01-GW01	3/4
		Iron	5270	13200	65-IS01-GW01	4/4
		Lead	2.1 J	14.5	65-IS01-GW01	4/4
		Magnesium	1490	2690	65-IS01-GW01	4/4
		Manganese	85.8	166	65-IS01-GW01	4/4
		Mercury	0.11 J	0.11 J	65-IS01-GW01	1/4
		Nickel	5.8	14.3	65-IS01-GW01	3/4
Groundwater	Total Metals (continued)	Potassium	1100	1660	65-IS01-GW01	4/4
		Selenium	2.5 J	2.5 J	65-IS01-GW01	1/4
		Sodium	8800 J	13300 J	65-IS03-GW01	4/4
		Vanadium	5.7 J	18 J	65-IS01-GW01	4/4
		Zinc	2.7 J	15.2 J	65-IS01-GW01	3/4
	Dissolved Metals					
		Aluminum	3530	22200	65-IS01-GW01	4/4
		Antimony	1.8 J	1.8 J	65-IS02-GW01D	1/4
		Barium	33.2	75	65-IS01-GW01	4/4
		Calcium	13900	29100	65-IS03-GW01	4/4
		Chromium	4.4 J	27.9	65-IS01-GW01	4/4
		Iron	5270	13200	65-IS01-GW01	4/4
		Lead	2.1 J	14.5	65-IS01-GW01	4/4
		Magnesium	1490	2690	65-IS01-GW01	4/4
		Manganese	85.8	166	65-IS01-GW01	4/4
		Potassium	1100	1660	65-IS01-GW01	4/4
		Sodium	8800 J	13300 J	65-IS03-GW01	4/4

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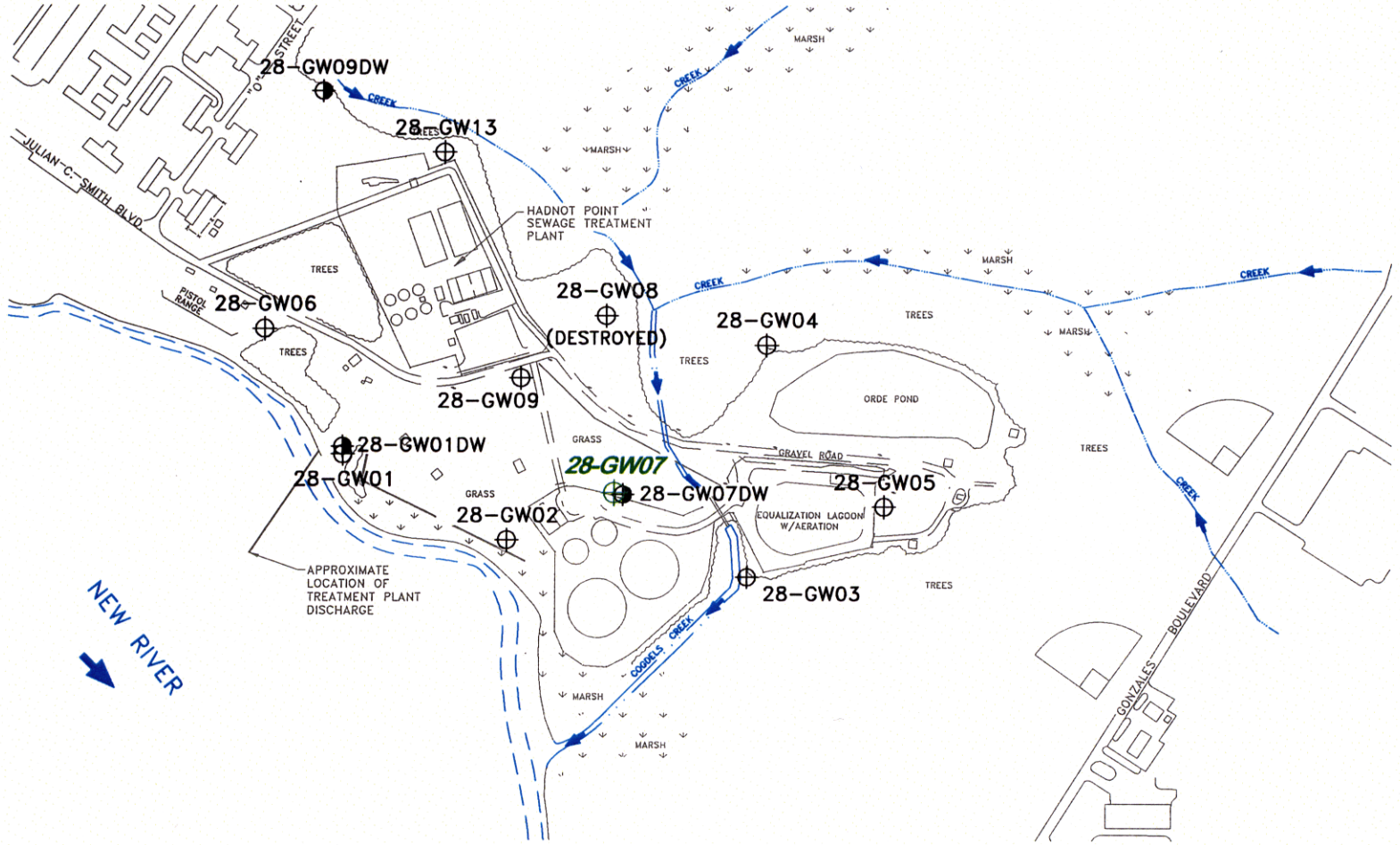


Baker
Baker Environmental, Inc.

NOTE:
- WELLS SHOWN IN BLACK REGULAR FONT ARE NOT INCLUDED IN THE MONITORING PROGRAM.
- 28-MW09 IS THE NEW SHALLOW WELL

LEGEND

28-GW01 – SHALLOW MONITORING WELL

28-GW01DW – DEEP MONITORING WELL

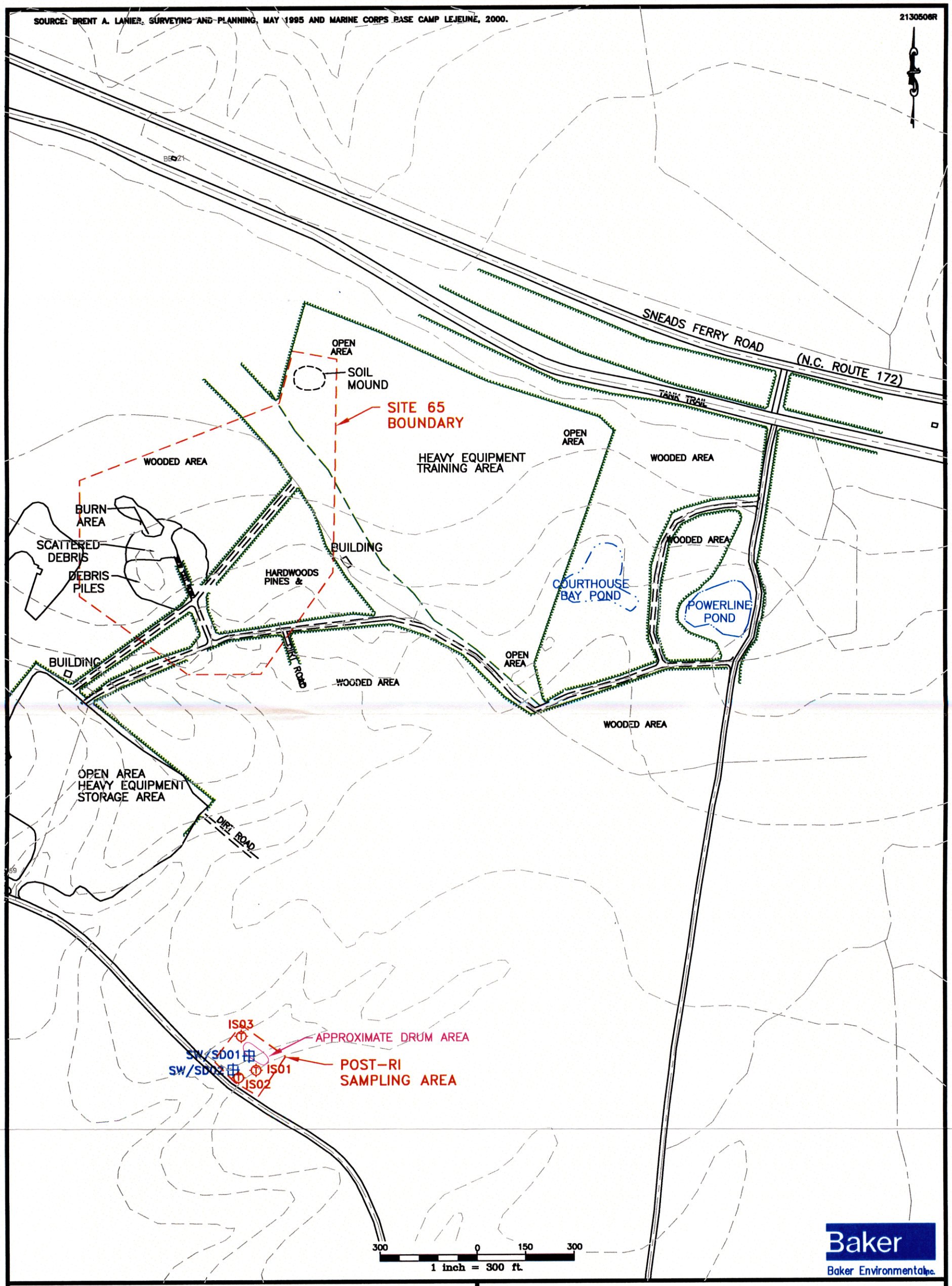
SOURCE: LANTDIV, FEBRUARY 1992 AND W.K. DICKSON, JUNE 1994

FIGURE 1
SAMPLING LOCATION MAP
SITE 28

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BRENT A. LANIER, SURVEYING AND PLANNING, MAY 1995 AND MARINE CORPS BASE CAMP LEJEUNE, 2000.

2130506R



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LEGEND

- SEDIMENT SAMPLE LOCATION
- TEMPORARY MONITORING WELL LOCATION
- APPROXIMATE DRUM AREA

SOURCE: MCB, CAMP LEJEUNE, 2000.

FIGURE 2
POST-REMEDIAL INVESTIGATION SAMPLE LOCATION MAP SITE 65

MARINES CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA